ELSEVIER MASSON

ALTER, European Journal of Disability Research 3 (2009) 159–178

www.em-consulte.com

Research Paper

Cold technologies versus warm care? On affective and social relations with and through care technologies

Froideur de la technologie versus chaleur du soin ? Relations affectives et sociales avec et au travers des technologies de soin

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Received 6 October 2008; accepted 29 January 2009
Available online 27 March 2009

Abstract

'Warm care' is often contrasted with 'cold technology'. But is this a meaningful opposition? Much research into healthcare technology frames the relation between humans and their technologies as purely rational and instrumental, where technologies are functional means to a human end. Other studies, however, foreground how technologies and users (re)configure each other in particular use practices. In this paper, we build on the latter work by studying relations with healthcare technologies as not only functional but also social and affective. We analyse a documentary about robot pets next to ethnographic material about a particular care technology. We analyse the relations between these technologies and their users, the values that are brought into play and the identities generated in the interaction. Then we analyse the structuredness of the interaction, and trace the social relations that are brought into being. Our main argument is that the opposition between cold technology and warm care does not hold, but that there are different relations between people and technologies within different use practices, allowing different affective and social relations, and that this blurs taken-for-granted categories such as medical versus social problems, warm versus cold care, play and seriousness, and affective versus rational technologies.

Keywords: Health care technology; Affect; Social relations; Robotics; Human–technology interaction

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1875-0672/$ – see front matter
doi:10.1016/j.alter.2009.01.003

Résumé

La « chaleur du soin » est souvent opposée à la « froideur de la technologie ». Mais cette opposition est-elle significative ? De nombreuses recherches sur la technologie des soins en santé conçoivent la relation entre les humains et les technologies dans les termes d'une relation purement rationnelle et instrumentale, où les technologies sont des moyens fonctionnels au service de fins humaines. D'autres études, cependant, mettent en relief la manière dont les technologies et les utilisateurs se (re)configurent réciproquement dans des pratiques d'usage particulières. Dans cet article, nous nous fondons sur le second type de travaux, en étudiant les relations entretenues avec les technologies de soins, non seulement comme des relations fonctionnelles, mais aussi sociales et affectives. Nous analysons un documentaire sur des robots animaux domestiques, ainsi que du matériel ethnographique portant sur une technologie de soin particulière. Nous analysons les relations entre ces technologies et leurs utilisateurs, les valeurs qui sont mises en jeu et les identités produites dans l'interaction. Puis, nous analysons la manière dont l'interaction se structure et repérons les relations sociales qui sont nouées dans ces circonstances. Notre argument principal est que l'opposition entre la froideur de la technologie et la chaleur du soin ne résiste pas à l'analyse et qu'il existe différentes relations entre les personnes et les technologies dans le cadre de différents usages, permettant l'établissement de différentes relations affectives et sociales. Cela crée un brouillage entre des catégories considérées comme allant de soi, telles que le médical versus les problèmes sociaux, la chaleur versus la froideur du soin, le ludique et le sérieux et l'affectif versus les technologies rationnelles.

Mots clés : Technologie de soins ; Affect ; Relations sociales ; Robotique ; Interaction humain–technologie

Introduction

In discussions about the use of new technologies in health care, including the most recent versions appearing as 'telecare', there is the fear that cold technologies will be implemented at the cost of warm human care (Bauer, 2004; Onor & Misan, 2005). They are called cold because they are, assumedly, purely rational and instrumental: technologies that may monitor blood pressures, but will not put reassuring hands on shoulders (Gammon, Sörlie, Bergvik, & Sörensen Höifödt, 1998). With telecare technologies in particular, there is the fear that they will replace human contact because they are introduced as a way to deal with a growing number of older people with chronic diseases with less professionals to care for them. These technologies measure blood sugar levels, make sure forgetful older people take their medications, register how often their fridge is opened in order to check if they are eating well, or will speak to them from the wall in case they are caught on their way out unattended. But however useful and functional, there is no tender loving care to be had from these devices.

This image of socially and affectively deprived lonely persons living amongst cold and instrumental technologies, however, skips the fact that people do indeed develop affective relations with technologies, and that technologies may help to develop social ties rather than cutting them. A straightforward example is the mobile phone. That some people particularly love their mobile phone is hard to overlook, when one sees the care with which these devices are 'dressed up' and personalised. Apart from the love of the actual device, there is affection because of its functionality. The mobile phone allows its user to communicate with, stay in touch and care for other persons in many places and almost all the time. So the affection for the device may well stem from the combination of its material attractiveness and the relations that it allows for.

In much of the literature on ICT technologies and their users,[1] the relation between humans and technologies is addressed as a rational and thus cognitive matter (Norman, 1988; Preece et al., 1994). Users are understood to be goal directed, and intentionally using technologies to do the tasks they set out to do. Major values here are efficiency, effectivity, reliability and predictability of technologies. On the other hand, there is the literature that addresses human computer interactions, but also more generally human technology interactions, from a social perspective. Schaumburg (2001) analyses the distinction between cognitive and social perspectives on technology by analysing users' perceptions of Microsoft's paper clip shaped office assistant. Kaplan et al. (2003) describes how people relate to a voice telephone, where a prerecorded voice answers questions, where users developed personal relations with it, by seeing the telephone voice as an 'unseen friend or helper'. The experiments of Reeves and Nass (2002) show how people assign human characteristics to computers and interact with them as if they are human, by being polite to them, flattering them, and so on. In a yet further approach, Suchman (2007a, 2007b) investigates how humans interact with computers, the role of difference between them, as well as sociability in such interactions, and how in this process humans and computers both configure each other. In this literature, as in the literature on robotics and artificial life, there is a vivid discussion about this sociality, what it entails, and the role of difference (Wilson, 2005). Spicing these discussions is what is actually 'human' and what is the ontological status of the robot (computer). The work of Sherry Turkle (1984) on computers and their lovers and of Donna Haraway (1991, 1998, 2003) on cyborgs and 'companion species' is central here.

There is, however, little literature into social and affective relations people develop with, and through, medical or health care technologies. Notwithstanding the vast literature agonising about patients failing to comply, the functions and use of medical technologies appear to be given and taken for granted. In these texts, they are 'cold' technologies; it is the functional rationality of the technologies that is put centre stage. The argument put forward here, however, is that all technologies both have particular functions and exist in social and affective relations with their users – positive or negative. If we trace the 'sociability' of medical technologies, this might teach us something about why people do or do not like to use these technologies, by attending to what norms or 'normativities' they enact (Singleton, 2007), how they structure interaction (Suchman, 2003), and thus in what ways technologies help to shape 'ways of living with disease' (Pols, in press).

In the field of social studies of science, technology and medicine, there are inspiring examples of studies of health technologies addressing 'hot' issues such as the way in which medical technologies may coordinate worlds of being ill with assignments in daily life (Willems, 2001), how user and wheelchair are both made to fit together (Winance, 2006) and how technologies assist in creating new forms of subjectivity by making and unmaking social distinctions, including those of gender, class and disability (Moser, 2005, 2006; Moser & Law, 2003).[2] In this paper we

[1] The term 'user' is a somewhat lazy and empirically doubtful reduction of a person using a certain technology. In most examples, these 'users' will, in all probability, not think of themselves as users (they are, for instance, 'calling a friend', not 'using a mobile phone'), and what they are doing with the technology (as we will point out later), may be something rather more specific than 'using' it. For reasons of brevity, however, we will use the term and make explicit who this user is when necessary.

[2] There are further interesting studies: Hendriks (1998) writes about the use of egg timers in the daily life of children with autism; Callon & Rabeharisoa (1998) write about oxygen devices for people suffering from muscular dystrophy; Mol (2008) on care for diabetes, Thygesen (2008) on smart homes in dementia care, and Mort, May, and Williams et al. (2003) on telecare.

build on this body of work to broaden the framework of discussions of medical and health care technologies and investigate how these are actually used in daily life, in order to learn what makes people appreciate them, or not.

The notion of 'script' is of special interest and relevance here (Akrich, 1992; Latour, 1992). Technologies may be analysed as a movie or a play, containing a script for those who use them. This helps define what characters they are, what their needs and wants are, and what they should do when. Technologies can thus be understood as prescribing roles and relations between different actors, enacting and making manifest particular normativities, and so also shaping the world the actors live in. A technology's script does not, however, determine its actual use all by itself. Technologies are acting and being acted upon within particular practices, and are hence interacting with actors who have their own notions about the parts they and other actors have to play. Like playwrights, at the time of the actual performance, technology designers are too far away to give prescriptions for use, whereas the users may adapt what they perceived as their initial goal in using a technology.

The aim of this paper then is to explore what kind of relations people establish with and through health care technologies meant for home use. We will explore the social and affective relations between health care technologies and their users by working through empirical examples stemming in part from a documentary shown on Dutch television, and in part from fieldwork for a project on telecare.[3] The television documentary portrays a robot dog called Aibo[4] and a robot cat called I-cat.[5] These robots are interesting for our topic because they are explicitly designed to establish social and affective relations with their users. The documentary interviews the designers and follow them in their work, but also attends demonstrations of the devices in meetings and interactions with users, showing how these relations are shaped.

From the research project on telecare, we focus on one such technology in Dutch health care: the Health Buddy.[6] This is a device meant for patient education and monitoring. It proved to be very successful, but not for the reasons expected. This case makes a good candidate for investigating whether other, non-intended effects such as new social and affective relations may provide better explanations for its success.

With these rather disparate yet complementary empirical sets of materials, we explore the following questions: (1) What kind of social and affective relations between user and technology are enacted in each case, exemplified by the values the technologies embody for the users? (2) How does the technology help to structure interactions and how does it use language? And (3) What kind of relations with other people are made using the technology?

[3] VPRO De toekomst, aflevering: Roboliefde. Maandag 13 februari 2006, nederland 3. The material from this documentary is limited, but unique and insightful: we were not in a position to do this type of research ourselves, if only because the technologies shown are not in use in the Netherlands or Norway. Since our research is exploratory and offers a way of analysing the creation of patterns of affective and social relations between technologies and their users, and a way of thinking about differences between care technologies and how these structure relations, we gratefully used the material in the documentary. It is not within the scope of this paper to critically evaluate the implications of 'real life' use and 'implementation' of these technologies.

[4] Aibo is developed by Sony, but was taken out of production in 2006. http://support.sony-europe.com/aibo/.

[5] Is being developed by Philips and is in the stage of being tested (www.research.philips.com/technologies/syst_softw/robotics/index.html).

[6] Fieldwork for this was done by Jeanette Pols together with Maartje Schermer.

Fig. 1. Aibo. Courtesy of Sony.

Aibo the robot dog

To introduce robot pets and their potential users, we will quote from the interviews or describe scenes in the documentary. The robot dog Aibo is designed as a companion and toy. It resembles a pet dog in the way it relates to its user. The documentary shows Aibo when its 'masters', inhabitants of a residential home in the USA, played with it and were interviewed about their experiences with the robot dog. They had kept the robot dog in their home for a research project to establish the effects on their feelings and behaviours (Fig. 1).

Aibo. Courtesy of Sony

Here is the robot dog and one of its elderly test-masters, Mrs Jones. In the quote, Mrs Jones is being interviewed about her experiences with Aibo.

> Mrs Jones about Aibo: Well, he's something else. And he makes me laugh. And I think everybody needs that more than anything. So.
>
> Interviewer: So how does it feel when you're laughing.
>
> Mrs Jones: I feel good. I really do. Yeah. He's something else. I missed him. He's been gone a long time, huh, Aibo? [Strokes Aibo] You been gone a long time, eh?
>
> [...]

Mrs Jones: I can tell all my happy thoughts. And sad thoughts. I can cry. And nobody's gonna know it, 'cause he's not gonna tell it.

Interviewer: So you think Aibo is a good companion?

Mrs Jones: Uhuh. Yes I do. [looks at Aibo] Especially the days when I'm down. [Mrs Jones cries]

Interviewer: So when you're down, how does Aibo help pick you up?

Mrs Jones: Oh. Mostly just the silly things he does. You know. 'Cause he makes me start laughing. And then I forget about being sad, or 'this didn't go right', or whatever.

There are no specific medical tasks the robot dog performs. The user can play with it, talk to it, and the robot dog may lift the spirits of its user by making her laugh and cheering her up. Although it is a companion rather than a medical device, it is exactly these friendly characteristics that, in the experiment in the documentary, are said to give it its particular healing function: that of helping to prevent loneliness and even depression. It is for this reason that it is being researched.

I-cat the robot cat

The robot cat, I-cat, is a device that is programmed in a way that the user can literally ask it to perform specific tasks. It is connected to other hardware in the home, and it can be asked to program the video, set the alarm, put on some music, recite the weather forecast, and so on. In other places than shown in the documentary, it was also programmed to undertake different tasks for different users, such as measuring blood pressure, reminding about medication or playing computer games (Fig. 2) I-cat. http://www.research.philips.com/newscenter/pictures/041209-icat.html.

The viewer witnesses the I-cat being tested out on first time users, inhabitants of a residential home in the Netherlands. Here is a scene from these test meetings [our translation from Dutch]:

[Mr Green sits in front of the I-cat]

I-cat: What can I do for you? [When talking, the I-cat moves its lips, eyes and head]

Mr Green: Well, so much is being done for me here already. Because I am 90 years old, and I hope to have a couple of years to go. Because it is very nice here.

Supervisor: You can maybe ask if she wants to set the alarm for you.

Mr Green: The alarm, could you set that for me?

I-cat: At what time you want the alarm to sound?

Mr Green: Erm. . . 6.30 in the morning.

I-cat: Would you like to be woken up by music, an alarm, or should I call?

Mr Green: Well, I like music, I do.

I-cat: The alarm is programmed.

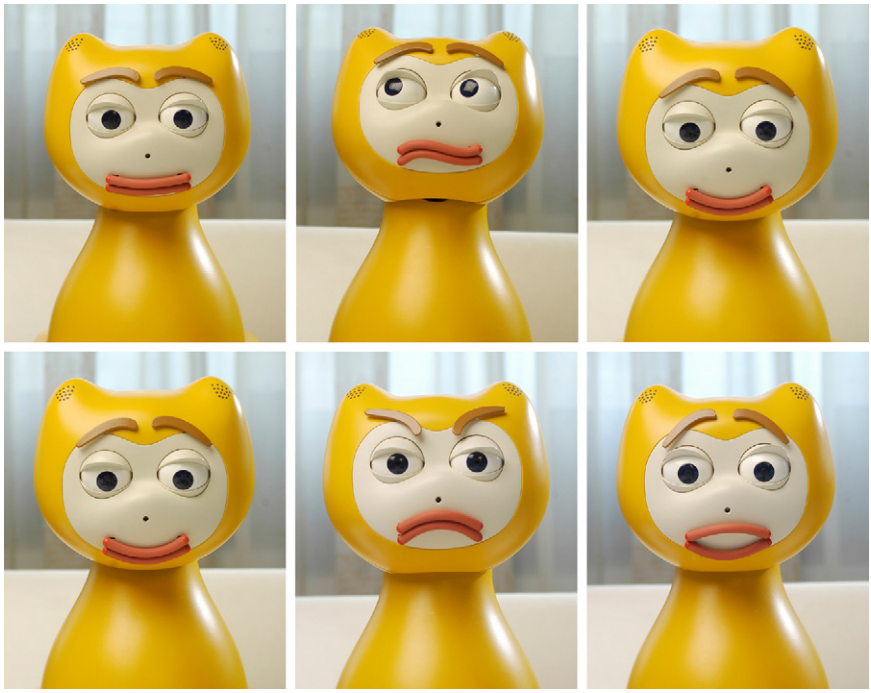

Fig. 2. I-cat.

The designer of the I-cat tells in the documentary that they designed the I-cat with a face, so that people may talk to it. It should be a friendly interaction, but not too human-like, because that would, it was assumed, induce fear rather than cosiness.[7]

The Health Buddy

The Health Buddy is a device that has recently been introduced and is currently used in pilot projects with particular groups of patients with chronic disease in the Netherlands. There is one project for patients with heart failure, one for patients with diabetes, one for patients with chronic obstructive pulmonary disease (COPD), and soon a project on palliative care will start.[8] All projects are in different regions of the Netherlands. For patients it means that a white box is installed in their homes, with a display on which questions appear daily and should be answered by the use of four buttons. The device was imported from the US and the questions and answers were translated into Dutch and adapted to Dutch care standards. The device sends data over the telephone line to a computer in the hospital where troublesome answers are visualised by a code and a nurse can read the answers the patients give.

When patients answer questions daily, the device works to detect fluctuating symptoms and tries to reinforce the implementation of the proper life rules that are associated with the particular

[7] In this sense, I-cat is not an anthropomorphic but a zoomorphic interface. For debates about the question whether interfaces should be shaped like humans-but-not-too-much see Schaumburg (2001); King (1995); King and Ohya (1996).

[8] Fieldwork for the care at a distance project was done in the heart failure project. There were some interviews for the diabetes project, and literature for the COPD project. We are soon to start researching the palliative care practice.

Fig. 3. Health Buddy.

disease the patient has. It does so by making the patients use the device daily, and hence makes them observe their condition daily, teaches them the proper facts about their disease, and gives instructions on how to behave. It was launched as a monitoring and educational device, which patients get in their homes for three months. The idea is that this should contribute to greater independence and self-management, prevent exacerbations, improve quality of life by preventing hospital admissions, and reduce costs. After three months, the patients' knowledge and skills for self management should be well improved. The device should then be returned and passed on to the next patient.

The project in which the Health Buddy was studied was concerned with normative issues surrounding the introduction of telecare. How would technologies such as the Health Buddy change care and how to evaluate that? The analyses revealed the affective relations patients developed with the device, triggering the writing of this article (Fig. 3).

Health buddy. http://www.healthbuddy.com/press/graphics_people.html.

Relations between technology and user

Now what does the use of these different technologies teach us about affective and social relations with and through technologies? We suggest that in order to create affective ties, the technology needs to *bring something of value* to the user. There are different values one may hold dear, but a characteristic of values is that they are affective and motivating: values like 'beauty', 'freedom', 'health' or 'friendship' may move people into doing things, such as adopting and using technologies. So our reasoning is this: if the technology brings something of value to the user, the user will be motivated to use the technology.

Dog games

How to find out what values are brought about by technologies? A first answer is: ask the user. In the quote where Mrs Jones describes what she likes about Aibo, she is very clear about what it means to her: it helps her overcome bad days and makes her laugh. But introspection may not be the best tool to uncover social motivations. Hence, one may also observe the kind of relations made possible by using the technology, the way user and technology are addressed, and

the particular activities they employ together. What values are brought forward in the interaction? For the robot dog played with in the documentary, these are friendship, fun, talk, intimacy, play and affection.

> Interviewer: So, do you think it's still a good companion for you?
>
> Mrs Jones: Oh, yeah. Yeah, yeah. I really do, yeah. He's great, and I love him, and... I enjoy having him here.
>
> Interviewer: So do you think Aibo can be your friend?
>
> Mrs Brown: O, he is my friend. He brightens up the sad world. It gives me something to talk about to people that is different from the world news. And other equally sad subjects.

In the interviews, the values emerging from the interaction with the robot dog are companionship or friendship and also interaction with others. Mrs Jones loves the dog and to Mrs Brown he is a friend and conversation topic. These are strong affective values. The whole idea of the robot dog is play and companionship. It does not have another task-oriented existence, even if carers like to see it in this way.

> Mrs Jones: But last night I think at 12 o'clock, we were still playing.
>
> Interviewer: At midnight?
>
> Mrs Jones: Yes, I didn't realise it was so late [Aibo gives paw] I just wish I felt better so I could get down on the floor with him more. Most of the time I sit here on the chair. But I get down on the floor with him too. [Aibo taps for attention]
>
> Interviewer: So is this more exercise than what you've been getting?
>
> Mrs Jones: O, yeah, I wasn't getting down on the floor. It's so hard to get up.

The interviewer here is looking for justifications for using the robot dog in terms of healthy behaviour (stimulating exercise is a good argument to convince funding agencies). This may be right from her perspective, but the motivation of *Mrs Jones* to relate to Aibo is play, not exercise. If Aibo were extended to include more rational services (as we will see with the I-cat), this might interfere with the affective value of companionship. It is its non-rational, playful and erratic characteristics that create the space for affective relations with this technology. And, in that way, it also allows for the mentioned 'side effects'.

So the user and the technology are configured as 'companions'. A companion is a very particular partner that invites particular interactions with the one kept company. Companions are companions *to each other*: their relation is more symmetric than when one is the helper and the other the patient. This means that the technology is not only caring for the user, but the user needs to take care of the technology too.

> Mrs Brown: Well, it makes me laugh more. And it makes me feel as I felt as a mother, sensitive to someone besides myself. [coughs] We tend, as singles, we tend to get self-occupied.
>
> Interviewer: So it gives you somebody to care for.
>
> Mrs Jones: Yeah, it's youthefying stuff.

Aibo is not only there to respond to the needs of its user, but the user needs to respond to and care for the needs of the robot pet (companion), too. The user has, for instance, to play along with the games the robot dog proposes, try to interest it for a game or put it on the charger. Thus, the user is not enacted as somebody who is in need of care: he or she is caring, too. Apart from somebody who 'likes to play', Mrs Brown becomes somebody who cares.

Cat business

Let's look at the I-cat: how does she and her user relate? The I-cat performs particular tasks when prompted. The values at stake here may be 'comfort' or 'service', depending on the tasks it performs for specific users. If the I-cat distributes pills, measures blood pressure or reminds the user of the time to take medication, it will play a part in the value of 'health', but it translates this remote and complicated value into the more prosaic value of 'taking your medication in time'.

The cat's identity seems to be that of a servant or maybe rather, because of its insistence on formality, a butler. Here is Mr Green at the start of his interaction with I-cat.

> [Mr Green sits in front of I-cat, which is apparently sleeping. Mr Green strokes I-cat.]
>
> I-cat: [wakes up] Hallo, I am Phoebe. [Eye blinking, lip and head movements] What is your name?
>
> Mr Green: My name is Aart. My first name, you see? My last name. . .
>
> I-cat: . . . only call you by your last name.
>
> Mr Green: Green!
>
> I-cat: What is your last name?
>
> Mr Green: Green.
>
> I-cat: Hello mister. . .
>
> Mr Green: Hello little lady
>
> I-cat: . . .Green. Nice to meet you. You look very smart today.
>
> Mr Green: [sits right in front of the robot cat, looks it in the eye] Yes, well, that. . .
>
> [. . .]
>
> I-cat: Is there anything else I can do for you?
>
> Mr Green: Well yes. In the future we get a new building. And we would like to have a swimming pool to go with it, we old timers.
>
> I-cat: [sad head shake] I do not understand what you mean.
>
> Mr Green: O, well, maybe some other time then.
>
> I-cat: Tomorrow it will be overcast, 9 degrees and 70% chance for rain showers.

Apart from the way it looks, the I-cat does not resemble a cat at all. It does not behave like a cat. (*We* never managed to instruct ours to program the video!) I-cat tries to build a service relation with its user, and this depicts the user in a particular way. The user of the I-cat is a mixture between 'master' (to be formally and politely addressed and served) and a 'patient' or 'fragile

person', who may find some technical tasks (too) complicated and is dependent on or comforted by the services of the I-cat. The cat provides no company.

> Interviewer: Ok. Do you think many people would like it if you would have an I-cat?
>
> Mrs Blair: Well. Some would. I think most people prefer to have a little dog, or a canary bird. For the company.

When the robot dog – values of 'companionship' 'fun' and 'play' – are compared with robot cat values of 'comfort' and 'service', it is not hard to feel the difference in affective appeal. Depending on one's sensitivity to these values and the material shape in which they come, one may be attracted to one device or the other. The value of companionship is, however, more compelling when the potential loneliness of elderly users with a chronic illness is taken into account. The robot dog, once embraced, is more affectively motivating and valuable to use than the robot cat. Mrs Jones *loves* Aibo. I-cat will, at best, be appreciated.

Health Buddy's route to safety

What kind of relations were made between health buddies and users, and what kind of values motivate these relations? First, there were the daily activities of answering questions on the white box. In theory, the patients should use the device as a 'stand alone', without a nurse looking into the answers they have given. Feedback is given on the screen, so it is possible for the users to work with that. This was not what happened in the care practice for the heart failure patients we interviewed. For them it was crucial that the device sent their data to their nurses in the hospital. Even if the text on the box urged them to call, the patients waited for the nurses to call them if there was a problem, as they knew the nurses would. If they did not call, apparently there was nothing to worry about, they reasoned. So, to the patients, the little white box was a direct line to the nurse, with the nurse in the role of the judge about their condition. One patient described how he had tested his set.

> Patient: When I got that box, I thought: what does this rubbish mean! And, on purpose, I gave the wrong answer. And half an hour later, the phone rang. So I tested it out, to see if it worked. And I did that again, a few weeks later, because they would maybe only check on the new patients. And again, the telephone rang! So they really do something with it.

The reported value was a feeling of safety. The patients feel they are being looked after by their nurse more often than when they would go to a once a three-month consultation. They are checked every day. Indeed, instead of less care, they felt they got more, if only in a different form. The patients feel that the nurses watch over them, and the patients are confident the nurses know what they are doing, or are in the best position to judge what needs to be done. They happily put their fate in their hands.

So rather than the expected values of 'knowledge about your illness', 'self management' and 'independence from the health care system', 'safety' and 'reliable dependence' proved to be the motivating values for people to use the device. It feels safe when familiar and specialised nurses keep an eye on you. They know what to do when something goes wrong. When faced with scary situations such as a life-threatening disease, it is not hard to imagine that safety is more directly motivating than independence. Independence is a rather more complicated and abstract value than safety when one feels scared. However, this switch in values also implied a change in need for the device. Feeling safe by being connected to the nurses, made the wish for this connection – and

hence for the device establishing it – as chronic as their condition. A lasting relation was brought into being in which the patients are indeed made patients. But because support was promptly supplied, they felt quite happy with that. One woman we interviewed called the box her 'body guard' or 'buddy guard'.

The attraction of the care system was also linked with the design, place and materiality of the white box. It is possible to do these dialogues over the Internet. But, the Dutch producer told us, so far, *nobody* opted for the Internet. Would this be a matter of old or new interfaces or does the materiality of the thing support the attachment to the white box? To boot up the computer (supposing you have one) in the attic every day, if you are not using it for other purposes, would mean a lot of time and is elaborate if it has to become a daily routine. In the shape of the white box, the illness issues have their own time, space and materiality. Answering questions by pushing buttons is included in the morning rituals and takes just a few minutes to complete. The device is close at hand, in the living room.[9] The daily sessions become a matter of routine, just as the life rules are meant to become routines. For the value it brings (safety by connection to the nurse), the device is very easy to use.

So in the relations between users and all three technologies, different values were enacted, establishing different affective connections. These relations may be warm or cold, positive or negative, intense or modest, motivating or not for different reasons. 'Service' to help set the alarm is of a rather less affective nature than is 'feeling safe' in the face of a life-threatening disease, or experiencing love and friendship when one feels lonely. Warm care may be established through technologies, as with the Health Buddy connecting patients with their nurses. The warmth may, however, also reside in the relation with the technology itself, as the use of Aibo and the Health Buddy showed. Instead of an opposition between warm human care and cold technologies, there are different constellations of technologies-and-users, enacting different affective temperatures.

Structure of interactions and use of language

In this section we take a closer look at the way the interactions between user and technology are structured, and the use and role of language in this structuring. One crucial aspect here is the (un)predictability in the reactions of a technology to its user. In order to be fit for *play*, the technology needs to have some unpredictability. If it is clear from the start that you will beat your chess computer, playing the game does not make sense. The robot dog, instead of following instructions, behaves in an erratic way. Mrs Jones again:

> Mrs Jones: He's got a mind of his own and he does what he wants to do. [Aibo lies on the floor being sweet with his headlights flickering and moving its head] He wants to sit, all the time, you know. It's like he's not paying attention. [to Aibo] Oh, are you mad at me? Huh? [throws a ball] Get it! Hit it! Yeah! [Laughs. Aibo pushes the ball with its head.] That's it! But we still have fun, don't we!

Different from the I-cat, the dog is rather more like a (cartoon) dog than like a (medical) technology that is oriented towards a particular task. It does not aim to measure blood pressure or provide tablets, but it would also not simply respond to orders to play. It may do different things than asked. This unpredictability of the robot dog makes it fit for play, but it does something else,

[9] The box being in the living room is an artefact of the technology: most people have their telephone connection in or near the living room.

too: it makes the robot dog an 'individual'. This individuality is enforced in different ways. The robot dog is programmed to learn to react to its particular user.

> Mrs Brown: My son said to me: 'Are you sure you don't want us to buy you one, mom.' And I said: 'But honey, the one I like, personality-wise, is this one. It matches me. So I don't think I'll buy one. It wouldn't be the same. I wouldn't wanna start all over'.

Mrs Brown has developed a relation with *this* individual. Like with real pets, the one cannot be simply swapped for the other. They have different personalities. But its unpredictability may be even more important in the staging of Aibo as an individual. As Mrs Jones said about her robot pet in one quote further up: 'he has a mind of his own.' The robot dog sometimes refuses orders or invitations to play, and in its repertoire is a shaking of its head that clearly signifies 'no', which is interpreted as that 'it wants something else'.

For the I-cat it is unthinkable to refuse orders. Its orientation towards service for the user is its raison d'être. The I-cat is polite, cooperative and neutral. The affections it shows underline this politeness (for instance, sadly shaking its head and looking down when it does not understand what the user is saying). In this sense it does not operate as an individual 'with a mind of its own', although this does not mean it is not seen as in possession of a mind.[10]

> Interviewer: Would you trust I-cat if it gave you advice?
>
> Mrs Charles: Well, I have to think about it. He has a different point of view, different from the one I have.
>
> Interviewer: But a robot will not have a different point of view?!
>
> Mrs Charles: Yes, but he is programmed, so to speak.
>
> Interviewer: Ok.
>
> Mrs Charles: He should not order me: 'do this and do that'. That does not fit with my nature.

Interestingly, the interviewer does not perceive the robot as a thing that embodies and implements values or has a 'point of view'. But Mrs Charles is not to be fooled. The robot has a point of view, not because this is an individual expression of an original standpoint, but because it embodies norms, it has a script. Rather than being an individual, Mrs Charles fears the cat may try to implement certain views of what is good for her. And she does not want to be patronised.

The individuality of the I-cat is suggested by its having a name (it introduced itself as 'Phoebe'). The users are partially turned into an individual as well, because they will be addressed by their last name. But this is not on the basis of the way the user *wants* to be addressed; this is programmed by the cat. A particular, polite distance between user and machine is programmed and cannot be changed by the individual user.

The formality introduces a kind of standardisation. The relationship is always a formal one. Formality leaves little room for improvisations: the servant is recognizable as a servant because it reacts as one, whereas the repertoire of the servant to act capriciously is very restricted. Servants would become individuals when their services are either very good or very bad; they would be promoted or sacked. Likewise, I-cat will have to win the users' affection by performing services

[10] Even users who are in love with their robot pets were still aware that they were machines as well. See the discussion on 'new ontologies' where traditional boundaries between humans and machines are questioned (Friedman et al., 2003; Suchman, 2007a; Melson et al., 2005; Vidal, 2007).

well. But this is very difficult, and the failure to do so is a breaching of the servant-ness of the I-cat.

> I-cat: Hello, I am Phoebe. What is your name?
>
> Mrs Johansen: My name? [She does not hear it very well, bends forward, looks at the supervisor] It is not so clear; it is the noise in the background.
>
> I-cat: What can I do for you?
>
> Mrs Johansen: You will have to speak a bit louder, eh.
>
> I-cat: I do not understand what you mean [hangs its head sadly]
>
> Mrs Johansen: You don't understand what I say? [Bends forward, to hear better]
>
> [To supervisor:] What does she say?
>
> Supervisor: She does not understand what you say!
>
> Mrs Johansen: [to the I-cat] Speak a little bit louder.
>
> I-cat: Can I do anything else for you?
>
> Mrs Johansen [does not hear it well, looks at supervisor] If he could do something for me? Well, I said: speak a bit more clearly. [Looks at supervisor] But he doesn't do that.
>
> I-cat: [blinks]: At what time do you want me to set the alarm?
>
> Mrs Johansen: What?!

Mrs Johansen is a first-time user and does not know what to expect of the I-cat, and this accounts for some of the struggles in the communication. But this fragment also shows that, apart from her problems hearing, there is also the problem that I-cat can only understand particular commands and questions, and not others.[11] The request to 'speak louder' cannot be interpreted by the robot cat. The possible sequences of questions and answers are very structured: there is a limited amount of possible questions, and a limited amount of possible answers. This causes communicational awkwardness quite easily. The programmed solution to these breakdowns is the sad admittance 'I do not understand what you mean'. But however polite, this is still a breakdown in the communication. It stops flowing. The new users start chatting to the I-cat, asking it different questions and making different remarks, but the robot cannot deal with these 'improvisations'; it has to stick to a structured program of verbal interactions, oriented towards the specific tasks the I-cat carries out.

The robot dog has a much easier task in keeping the communication flowing: it does not use language. It makes sounds (music), moves around, shows lights and wags its tail. There is indeed a dog-communication-grammar in these behaviours. It may refuse orders, or it may want to seduce the user to play. It may show sadness, happiness, tiredness, give hugs, and so on. But the *timing* of these responses as well as the way to react to the robotic logic is not structured by language use or human conversation conventions. Its syntax (order of elements) and semantics (meaning)

[11] Suchman (2007a: 247) points out that for technologies hearing is rather more difficult than speaking. The difficulty with developing speech recognition software relates to the difficulty for a technology to understand meaning and not only recognise a script.

are much more loosely defined. An invitation from the user 'to play with a ball' may be quite smoothly followed by Aibo's refusal or a little dance. It would not go along with what the user wants it to do, but this would not be a breach of the communication. It would make perfectly acceptable owner-dog-like sequences of events. The dogs' reactions 'fit' many situations. No logic is expected of it, in the way it would be for language users.

The use of language in the technology reduces the options for the conversation partner to react to any degree. To ask at what time the alarm should be set allows for one particular kind of answer: mentioning a particular time. But even open questions or remarks restrict the possible reactions. Out of context (or convention) remarks like a weather forecast in the middle of a conversation are absurd, mostly followed by a breakdown in the conversation. Because a robot is programmed, it is not able to improvise outside its script, yet the script may allow for more or less flexibility in interactions.

Health Buddy for play?

Now how is the interaction structured in the very verbal technology of the Health Buddy? At first sight, the 'conversation' with the Health Buddy seems as structured as one may have it. The questions are closed questions, and the answers are preprogrammed multiple choice items. Yet, there are not many breakdowns.[12] It is possible to give an answer that is wrong by its content, but that will not stop the machine from reacting. It will explain why the answer is wrong and give the correct one. The actual 'grammar' of the communication is respected, because this is directed through the buttons. This leaves very little room for a 'wrong turn' in the conversation that causes breakdown. As long as the user pushes buttons, the 'conversation' flows and the answers are grammatically correct.

The relation between language, structuredness and interaction is layered. Take the knowledge questions. These are questions about the facts of disease, symptoms or healthy living. Patients like these questions and often turn the answering of these questions into a quiz or competition with other members of the household. In this way they answer questions together, and turn the event into something else than a one-way questionnaire. So even if questions and answers are structured and structuring, affective communication may take place by changing their meaning and by drawing in other conversation partners. The users turned the interactions with the Health Buddy into a competitive game rather than a knowledge test. The health quiz is different from the knowledge test, the user now being a potential winner or loser of a game, instead of a potential passer or failure on a knowledge test (which is about facts one ought to know, because they are about one's illness). A particular interaction is built in this use practice.

There is yet another, rather paradoxical way around the structured questions and answers. This has to do with the 'nurse sitting on the other end'. As we showed before, the prestructured questions and answers are read by the nurse in the hospital, and the alarms in particular. The patients know that the nurse will contact them when something is wrong. When she does so, the patients can explain why they do not want to follow some advice or discuss matters that cannot be sent over the white box. The white box would be the vehicle over which to sound the alarm to set this more flexible interaction in motion.

Even more paradoxical is that the structured and factual communication turns out not to be so 'hard'. The protocol regulating the questions the patients are asked over the Health Buddy is a gen-

[12] These do appear when the 'right answer' is not given or the question is meaningless to a particular individual.

eral one. This means that the questions are not fine-tuned towards each individual patient. Patients may have to answer questions that are irrelevant or meaningless to their situation. Some recommendations they simply refuse to follow up, and when giving certain answers, patients feel frustrated that they cannot explain them (an imbalance in their weight might be a troublesome fact, but may also be explained by yesterday's wedding party). This obscures the status of the information from the Health Buddy, even if it is well-structured and built on generally valid facts about heart failure. The ambiguities that come with the general protocol create the space (and the need) for the (flexible) contacts with the nurse and flexible interpretations of the messages shown on the box.

So the structuredness of the interaction may hinder the development of affective ties with technologies when improvisation is not possible.[13] Solutions to prevent communication breakdown are important if the relation between user and technology is meant to be affective in the positive sense; (don't kick the computer!). These interactions may be structured on different levels, on the level of the robot pet to play with, a white box to tap buttons on, on the level of questions that need answers, or in the content of what is exchanged. Although there is a relation between language used by functional machines and their inflexibility, the very structured and functional device of the Health Buddy shows that this relation is more complex. Functionalities may be multiple ones and may be different from those intended. The Health Buddy is a success because it can connect patients and nurses, even though the device was not intended to do so by its designers. Quite the contrary: the Health Buddy was intended to disconnect, or make fewer or more seldom points of connection! What this shows, then, is that devices get their particular shape, value and functions in the practice in which they are used, and that users creatively negotiate the scripts that technologies carry.

Relations with others

A last aspect of how technologies create affection and attachment that has already slipped into the examples and that we want to explicate here, is the way in which health care technologies may establish or facilitate relations with others. In the documentary about the robot pets, we get a glimpse of a successful way in which the technology establishes relations between technology owner and others. When Mrs Jones takes her robot dog to the common space in the residential home, the dog facilitates contacts between the shy and depressed Mrs Jones and the other inhabitants.

> The project coordinator and Mrs Jones enter the common room. Mrs Jones carries Aibo. Four ladies greet them: Hi! Hi!
>
> Mrs Jones: [hugs one of the women] How you doing?
>
> First woman: I'm fine. What have you got?
>
> Mrs Jones: I going to show off Aibo. [Everyone gets a look]
>
> Project leader: [voice over] Some people are fairly shy. And what Aibo does, it allowed people to communicate, with this person: 'O, hi Aibo, how's the dog?'
>
> Second woman: O, there's Aibo! Hi Mary [= Mrs Jones].

[13] In the literature, it is pointed out that affectivity in the interface may irritate when it gets in the way of accomplishing a particular task (Schaumburg, 2001). Here, the functionality gets in the way of affective possibilities.

Project leader: [voice over] They would approach *her* and talk to her, so it increased her socialisation. So it got her out of the room, it got her the attention that she liked and that she normally wouldn't have, without the dog.

[Mrs Jones sits on the floor. Aibo plays with a pink ball and the ladies comment.]

Mrs Jones: He's upset too! Hit the ball! All right! Good job.

The others cheer:

Come on! You can do it! You can do it! Yes you can!

First woman: Are we working you too hard? Are you tired? [Aibo yawns. They all watch Aibo and laugh or try to make him go towards them. Aibo waves with a front paw. The ladies applaud happily and cheer when Aibo hits the ball.]

So the robot pet facilitates social ties with other people, as the project leader points out in the voice-over. Of course, the I-cat may do something comparable for its proud owner, although there is less possibility for play, and it is not a mobile technology. The people would have to come to the house to see the robot cat. The documentary does not show this, so we cannot say more about this. The Health Buddy is, likewise, a particularly homey device. But in the house, it has some interesting linking skills.

The Health Buddy brings, as we have discussed, the sense of being in contact with the nurse. It makes the patient feel looked after, and provides more points of contact with the health care system than before. But it allows for other contacts, too. It serves to reassure worried family members, who feel their spouse is being looked after. We mentioned the health quiz with members of the household. Even if the device does not explicitly address spouses, they happily compete in the health quiz. Also, the device may be shown off to visitors.

Mrs Charles: Sometimes people from the homecare come in, and most of them did not see the device yet. 'What device is that?!' And then I say: that is my homework. [laughs] And then they really want to see it, and see how I answer the questions. They think that is interesting.

Mrs Horace: It *ís* interesting!

Thus the device is at the intersection of more relations than those with the nurse. It also allows patients to be possessors of an interesting new device to show off to visitors, such as homecare workers, or, for that matter, interested researchers. The patients obtain a position of being the expert on something new. In its material 'white box-ness', the device may be easily demonstrated to others. This may all be of value to users and does not make them cold or lonely. Health care technologies may be part of different kinds of social interactions built around them.

Concluding discussion

In this paper it became clear that there is no opposition between cold technology and warm human care. There are indeed affective relations between humans and technologies and technologies may well be loved. The successes of the robot dog and the Health Buddy are difficult to understand without a notion of affective relations between people and technologies, and without a notion of the social relations that technologies generate. Even assumedly neutral, functional

technologies embody values, mediate affections, and help establish some social relations and identities rather than others.

We suggest that the critical question of warm care or cold technology could be better reformulated by asking *what kind* of affective and social relations are enabled by medical technologies. What values may the interaction with particular users bring, and what kind of affective temperature do they stage? What social relations are built with or through it, and to whom might these be of value? Who would benefit from friendship, who from service, and what should we think about the dream of safety? Not everyone will feel invited to share feelings with a robot dog, or chat with it as with a friend. And we also spoke with people refusing technologies like the Health Buddy because they did not feel 'ill enough'. Being looked after comes at the price of being made a patient.

By analysing affective and social relations in the study of health care technologies, what is targeted as the problem of the user and what is thought of as proper care may also change. The borders between what are social problems and what are medical problems may become shaky. Robot dogs may turn out to be better for the condition of an elderly heart failure patient than a stand alone Health Buddy. Initial goals may shift. At the start of the project, the Health Buddy was a self-management device, meant to cut social ties and ties with the health care system rather than enforce them. But in the way the Health Buddy was used, the ties between patients and nurses were enforced rather than weakened. Warm and cold, rational and affective, medical and social, technological and sociable are not opposites, but are aligned in different ways in different practices. How connections are made depends on who the users are, the possibilities the technology brings, and result from the way in which all the elements interact. Hence, alongside analysing design processes, it remains crucial to learn about these possible connections by observing use practices. Such analyses will reveal different ways of complying, folding different needs and values together, rather than either complying or not.

Acknowledgements

This paper is developed from our presentation held at the conference 'Telecare: Dialogue and Debate - The emergence of new technologies and responsibilities for healthcare at home in Europe', September 20–21th, Utrecht, The Netherlands, organised by Maggie Mort, Celia Roberts & Christine Milligan (Lancaster University, United Kingdom) for the MEDUSE Network, in collaboration with the Academic Medical Centre in Amsterdam, for the NWO sponsored project 'Care at a distance. A normative investigation into telecare.' We are grateful to Maartje Schermer and Dick Willems with whom we collaborated in this latter project. And again to Maggie, Celia and Christine, with whom we now work for the EU funded project: Ethical Frameworks for Telecare Technologies (EFORTT) for older people at home.

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